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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/945,397	08/30/2001	Gurtej Singh Sandhu	303.541US2	4205
21186	7590	12/03/2004	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402			TRINH, MICHAEL MANH	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 12/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/945,397

Applicant(s)

SANDHU ET AL.

Examiner

Michael Trinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-12, 14-20, 22-25, 27-33, 35, 109, 111-113, 115, 117, 119-121, 123-125, 128-131 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-12, 14-20, 22-25, 27-33, 35, 115, 121, 123-125, 128 and 129 is/are allowed.
- 6) ☒ Claim(s) 109, 111-113, 117, 119-120, 130-131 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

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DETAILED ACTION

*** This office action is in response to Applicant's amendment filed September 20, 2004.

Claims 10-12,14-20,22-25,27-33,35,109,111-113,115,117,119-121,123-125,128-131 are currently pending.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action. m

Claim Objection

*** Claims 24,25,32, and 35 are objected to since these claims are allowed and no longer withdrawn. The status identifier of "withdrawn" should be changed to "original". Correction is required in response to this office action.

*** Claim 113 is objected to since the term "a dielectric layer" is used twice for different layers ("forming a dielectric layer on an insulating layer" and "forming a dielectric layer on the container structure using the dielectric cap as part of the dielectric layer". Modifiers, such as first and second, should be included. Correction is required in response to this office action.

Claim Rejections - 35 USC § 112

1. Claims 109,111,112,113,117,119,120,130,131 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 109: a) meaning and scope are unclear and indefinite, since there is no clear link and interconnection between the conductive container structure and the sacrificial layer, and where to form a sacrificial layer on (re claim 130, where to form a fill layer and an insulating layer?); and b) meaning and scope of "forming a dielectric cap on a top of the sidewalls and sacrificial layer" are unclear and indefinite for which dielectric, since, as shown in Figure 6, the dielectric layer 90 is formed on the top of the sidewalls and sacrificial layer 50; whereas, Figure 7 the dielectric cap 90 is not formed on the sacrificial layer 50 (claim 113, lines 8-10, recites a dielectric layer, not a dielectric cap).

Re claim 113, meaning and scope of "...a conductive layer" is lacking proper antecedent basis, and should be "the conductive container structure". The term "a fill layer" lacks proper antecedent basis and unclear for where it is filled.

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Re claim 117, meaning and scope of “forming a dielectric cap on a top of the sidewalls and a fill layer in the container structure” are unclear and indefinite for which dielectric, since, as shown in Figure 6, the dielectric layer 90 is formed on the top of the sidewalls and sacrificial layer 50; whereas, Figure 7 the dielectric cap 90 is not formed on the sacrificial layer 50 (claim 113, lines 8-10, recites a dielectric layer, not a dielectric cap).

Re claim 131, “a dielectric” is lacking proper antecedent basis since there is no positive recitation of dielectric. Moreover, it is unclear for removing which dielectric.

(Dependent claims are rejected as depending on rejected base claim)

Insofar as understood, the claims are rejected as below

Claim Rejections - 35 USC § 102

2. Claims 109,113,117,130-131 are rejected under 35 U.S.C. 102(b) as being anticipated by Dennison (5,206,183).

Dennison '183 teaches a method for forming a semiconductor container capacitor structure having a dielectric layer comprising at least the sequential steps of: forming a conductive container structure 28 having a closed bottom and sidewalls extending upward from the closed bottom (Figs 3,6,20; cols 4-5; col 6, line 59 through col 7); forming a sacrificial layer (22 in Figures 14-15; 30a in Figures 18-19,5-6); forming a dielectric cap 75 (Figs 20-21, col 7, lines 29-60) on a top of the sidewalls of the conductive container structure 28 having the dielectric cap 75, wherein the dielectric cap 75 remained on the top of the sidewalls is used as part of the dielectric layer for electrically insulating (Fig 21; col 6, lines 52-58; col 12, lines 42-45), and sacrificial layer (22 in Figures 14-15; 22,30a in Figs 18-21,5-6); removing at least a portion of the sacrificial layer (22 in Figures 14-15; 22,30a in Figs 18-21,5-6); forming a dielectric layer (42,38 in Fig 6) thereafter on the capacitor structure, and thus, including the dielectric cap 75 used as an electrical insulator about portions of the storage node projecting into the bit line contact openings; and forming a cell plate 44 (Fig 6) on the dielectric layer 42,38 wherein the conductive container structure 28 comprises polysilicon, wherein the dielectric cap 75 comprises oxide (Figs 20-21). Re claim 130, wherein the sacrificial layer include a fill layer 22 and an insulating layer 21 (Fig 1, col 4, lines 3-25). Re claim 131, wherein removing at least

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a portion of the sacrificial layer 22 includes partially removing a dielectric 21 (Fig 1, col 4, lines 3-39).

Claim Rejections - 35 USC § 103

3. Claims 111-113, 119-120 are also rejected under 35 U.S.C. 103(a) as being unpatentable over Dennison (5,206,183), as applied above, and further of Lur et al (5,364,817) and Abernathey et al (4,725,560).

Dennison '183 teaches a method for forming a semiconductor device of a container capacitor as applied to claims 109, 113, 117, and 130-131 above.

Dennison '183 already teaches material of the dielectric cap comprising silicon oxide; whereas, claims 111 and 119 recites silicon oxynitride, and while claim 113 also recite selecting dielectric cap material from a group consisting of oxides, nitrides, and silicon oxynitrides. Dennison lacks annealing the dielectric cap in claims 112 and 120.

However, Lur et al teaches (at col 3, lines 38-56) forming a dielectric cap 28 on the sidewalls of a conductive container structure 24, wherein the dielectric cap comprises a dielectric material selected from a group consisting of oxides, nitrides, and silicon oxynitrides. Abernathey et al teach forming silicon oxynitride as a storage dielectric cap material instead of silicon oxide, and annealing the dielectric cap material of silicon oxynitride (col 5, lines 44-68; col 3, lines 16-53; cols 6-7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the dielectric cap of Dennison by alternatively using a dielectric material selected from a group consisting of oxides, nitrides, and silicon oxynitrides, as further taught by Lur et al and Abernathey, because the substitution of art recognized equivalent dielectric materials would have been obvious and within the level of one having ordinary skill in the semiconductor art, wherein annealing the dielectric cap of silicon oxynitride as taught by Abernathey would have been obvious to one of ordinary skill in the art because of the desirability to form a high quality silicon oxynitride dielectric cap layer having a high breakdown voltage for storage capacitor. Additionally, it would also have been obvious to one of ordinary skill in the art at the time the invention was made to form the capacitor electrode of Dennison by employing other known alternative silicon materials selected from a group consisting of

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amorphous silicon, polysilicon, and hemispherical grain polysilicon, because the substitution of art recognized equivalent silicon materials for forming the capacitor electrodes would have been obvious and within the level of one having ordinary skill in the art in order to form silicon electrodes for the capacitors.

Allowable Subject Matter

4. Claims 10-12,14-20,22-25,27-33,35,115,121,123-125,128,129 are allowed for reasons already of record, wherein the references of record, alone or in combination, do not anticipatively disclose each and every aspect of the claimed method, or fairly make a prima facie obvious case of the claimed method, in combination with other processing claimed limitations, the inclusion in all of the claims of forming a dielectric cap on a top of the sidewalls of the conductive layer by forming a dielectric layer on the insulating layer, the conductive layer and the fill layer, and removing the dielectric layer from the insulating and the fill layer.

Response to Arguments

5. Applicant's remarks filed September 20, 2004 have been fully considered but they are not persuasive, and are also moot in view of the new ground(s) of rejection.

** Applicant apparently remarks (at 9/20/04 remark pages 1-2) that Dennison (5,206,183) does not teach "forming a dielectric cap on a top of the sidewalls and sacrificial layer...". However, since, as shown in Figure 6 of the present application, the dielectric layer 90 is formed on the top of the sidewalls and sacrificial layer 50 while Figure 7 the dielectric cap 90 is not formed on the sacrificial layer 50 (claim 113, lines 8-10, recites a dielectric layer, not a dielectric cap).

Insofar as understood, the claims are also rejected by Dennison (5,206,183) for the reasons as applied above.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F from 8:30 Am to 4:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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A handwritten signature in black ink, appearing to read 'Michael Trinh', is positioned above the printed name and title.

Michael Trinh
Primary Examiner